

CLAIMS

[1] A quartz pressure sensor, comprising a bottom plate made from an insulating material, a lower electrode film and a dielectric film sequentially laminated on a face of said bottom plate, a detecting piece provided at a position thereof opposed to said dielectric film with a thin portion and fixed on the face of said bottom plate, and an upper electrode film formed in at least one portion of said thin portion having a positional relationship thereof opposed to said lower electrode film, in which a fine gap space is provided between said upper electrode film and said dielectric film, characterized in that said detecting piece is made from a quartz material.

[2] A quartz pressure sensor, comprising a bottom plate made from an insulating material, a lower electrode film laminated on a face of said bottom plate, a detecting piece provided at a position thereof opposed to said lower electrode film with a thin portion and fixed on the face of said bottom plate, and an upper electrode film formed in at least one portion of said thin portion having a positional relationship thereof opposed to said lower electrode film, in which a fine gap space is provided between said upper electrode film and said lower electrode film, characterized in that said detecting piece is made from a quartz material.

[3] The quartz pressure sensor according to claim 1 or 2, characterized in that said airtight space is formed at least by a recessed portion formed on one portion of a lower face of said

detecting piece or a recess formed on a face of said bottom plate.

[4] A quartz pressure sensor, comprising a lower electrode film and a dielectric film sequentially laminated on a face of a bottom plate made from an insulating material, a detecting piece
5 constituted of a thin portion and a thick portion surrounding said thin portion, and an upper electrode film formed in at least one portion of a lower face of the thin portion in said detecting piece, in which an airtight space defined by a fine gap is formed between the thin portion and the bottom plate by fixing a lower face of
10 the thick portion in said detecting piece to the face of the bottom plate in a close contact manner, characterized in that said detecting piece is made from a quartz material.

[5] The quartz pressure sensor according to any one of claims 1 to 4, characterized in that said bottom plate is made from a
15 quartz material.

[6] A quartz pressure sensor, comprising a dielectric film also serving as a lower electrode film and laminated on a face of a bottom plate made from a conductive material, a detecting piece constituted of a thin portion and a thick portion surrounding said
20 thin portion, and an upper electrode film formed in at least one portion of a lower face or an upper face of the thin portion in said detecting piece, in which an airtight space defined by a fine gap is formed between the thin portion and the bottom plate by fixing a lower face of the thick portion in said detecting piece
25 to the face of said bottom plate in a close contact manner, characterized in that said detecting piece is made from a quartz

material.

[7] A quartz pressure sensor, characterized in that the detecting piece according to any one of claims 1 to 6 is disposed such that a main face of the thin portion on its flat face side is opposed
5 to the face of the bottom plate.

[8] The quartz pressure sensor according to any one of claims 1 to 7, characterized in that said detecting piece is formed with the thin portion by performing a thinning work on a quartz plate with etching.

10 [9] The quartz pressure sensor according to any one of claims 1 to 8, characterized in that said detecting piece and said bottom plate are made from quartz materials of the same kind, and the detecting piece is joined to the bottom plate such that crystal axes of the detecting piece and the bottom plate coincide with
15 each other.

[10] The quartz pressure sensor according to any one of claims 1 to 9, characterized in that said quartz pressure sensor is of a touch-mode type.

[11] The quartz pressure sensor according to any one of claims
20 1 to 10, characterized in that the thin portion in said detecting piece or the upper electrode film is in contact with said dielectric film or the face of the bottom plate during non-measurement.

[12] The quartz pressure sensor according to claim 11, characterized in that said airtight space is in a vacuum state.

25 [13] The quartz pressure sensor according to any one of claims 1 to 12, characterized in that said detecting piece is made from

a quartz material having a cut angle which can control a resonant frequency by plate thickness adjustment.

[14] A quartz pressure sensor, characterized in that the quartz material according to claim 13 is made from a quartz material having a thickness sliding oscillation mode or a thickness vertical mode.

[15] The quartz pressure sensor according to any one of claims 1 to 14, characterized in that said detecting piece is constituted of an AT cut quartz plate.

[16] A manufacturing method of the quartz pressure sensor according to any one of claims 13 to 15, characterized by comprising a step of frequency-converting the thickness of said thin portion to confirm the same.

[17] The quartz pressure sensor according to any one of claims 10 to 12, characterized in that said quartz pressure sensor is a touch-mode type pressure sensor where a quartz plate with a cut angle where a normal line to a face of the quartz plate is approximately coincident with a quartz crystal Z-axis direction is used as the quartz plate constituting the detecting piece.